

REMARKS

Claims 1, 4-7, and 9-22 are pending. Applicants respectfully request that the Examiner reconsider this application in view of the following remarks.

The Examiner rejects claims 1, 4-7, and 9-22 under 35 U.S.C. § 103(a) as obvious over LaBarge, et al., U.S. Patent 6,489,259 or its corresponding U.S. Patent Application Publication 2002/0086793. As the disclosures of the two references are identical, we only discuss U.S. Patent 6,489,259 (denoted herein as “LaBarge”).

Among the rejected claims, claim 1 is the only independent claim and will be discussed first.

Claim 1 covers a catalyst containing copper, ZSM-5, and β zeolite. The ZSM-5 has an average particle diameter not greater than 0.5 μm.

LaBarge describes a catalyst mixture containing 5 components, among which, (i) the third, fourth, and fifth components each include a zeolite, e.g., ZSM-5 or β zeolite, and (ii) the forth and fifth components may also include copper. See column 3, line 57 through column 4, line 45. Unlike claim 1, this reference is silent on the particle diameter of the ZSM-5. It follows that the ZSM-5 used in LaBarge’s catalyst can have any practically reasonable particle diameter, e.g., 1 nm or 100 μm. In other words, LaBarge at most discloses a very large range for the ZSM-5 particle diameter. By contrast, the ZSM-5 recited in claim 1 has an average particle diameter not greater than 0.5 μm, i.e., a small fraction of the prior art range. In short, LaBarge discloses a broad genus, whereas claim 1 recites a narrow subgenus.

Applicants would like to bring to the Examiner’s attention a pertinent MPEP statement:

... the mere fact that a prior art genus contains a small number of members does not create a *per se* rule of obviousness. Some motivation to select the claimed species or subgenus must be taught by the prior art. [MPEP 2144.08 IIA4(a); emphasis added]

In this case, LaBarge teaches an extremely broad genus, much broader than a “genus [which] contains a small number of members.” Based on the above MPEP

statement, the fact that LaBarge teaches a broad genus clearly does not create a *per se* rule of obviousness and, indeed, the Examiner must find prior art teachings of some motivation to select the claimed subgenus. As discussed above, nowhere in LaBarge is any particle diameter of ZSM-5 mentioned. Thus, no motivation to select the recited subgenus is provided in this reference. In other words, Examiner has failed to establish a *prima facie* case of obviousness.

Even if the Examiner had established a *prima facie* case of obviousness (which Applicants do not concede), this rejection can be readily overcome by unexpected results described in the declaration by inventor Takuji Nakane, copy attached hereto as "Exhibit A."<sup>1</sup> As shown in the declaration, a catalyst of this invention that contained ZSM-5 having an average particle diameter not greater than 0.5  $\mu\text{m}$  was prepared following the method described in Example 4 in the present Specification (see Example 8 shown in the declaration). Also prepared was a comparative catalyst, which is the same as the just-mentioned catalyst except that the ZSM-5 had an average particle diameter of 2-4  $\mu\text{m}$  (see Comparative Example 3 shown in the declaration). The two catalysts were tested for their NO<sub>x</sub> purification activity. The results show that the catalyst of this invention, in which ZSM-5 had an average particle diameter not greater than 0.5  $\mu\text{m}$ , was more active in reducing NO<sub>x</sub> in exhaust gas than the comparative catalyst, in which ZSM-5 had an average particle diameter greater than 0.5  $\mu\text{m}$ . See Table 5 in the declaration.

The Examiner is reminded of the following MPEP statement:

Applicants can rebut a *prima facie* case of obviousness based on overlapping ranges by showing the criticality of the claimed range. "The law is replete with cases in which the difference between the claimed invention and the prior art is some range or other variable within the claims. . . . In such a situation, the applicant must show that the particular range is critical, generally by showing that the claimed range achieves unexpected results relative to the prior art range." *In re Woodruff*, 919 F.2d 1575, 16 USPQ2d 1934 (Fed. Cir. 1990). MPEP 2144.05 III; emphasis added.

<sup>1</sup> A signed declaration will be submitted as soon as it becomes available. Of note, the declarant is a researcher residing in Japan.

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As mentioned above, LaBarge at most teaches a very broad range overlapping (here, encompassing) the narrow range recited in claim 1. The declaration shows unexpected results in connection with the narrow range recited in claim 1, i.e., a catalyst containing ZSM-5 having an average particle diameter not greater than 0.5  $\mu\text{m}$  was superior to a catalyst containing ZSM-5 having an average particle diameter greater than 0.5  $\mu\text{m}$ . Pursuant to the above-quoted MPEP statement, the *prima facie* case of obviousness based on an overlapping range has been rebutted by a showing of the unexpected results described above.

Claim 1 can be distinguished from LaBarge on a second and independent ground.

Claim 1 also requires that the weight ratio of the ZSM-5 to the  $\beta$  zeolite range from 1:0.1 to 1:5.

LaBarge does not mention any weight ratio of ZSM-5 to  $\beta$  zeolite. Indeed, the only example in this reference describes a catalyst containing ZSM-5, but not  $\beta$  zeolite. In short, this reference does not provide any suggestion or motivation to select a weight ratio of the ZSM-5 to the  $\beta$  zeolite from the range recited in claim 1, i.e., from 1:0.1 to 1:5. In other words, the Examiner has failed to establish a *prima facie* case of obviousness with regard to the recited weight ratio.

Applicants would also like to point out that, even if such a *prima facie* case of obviousness had been established (which Applicants do not concede), the obviousness rejection can be readily overcome by unexpected results described in the above-mentioned declaration by inventor Takuji Nakane. This declaration describes two catalysts of this invention, one containing ZSM and  $\beta$  zeolite at a ratio of 11:8 and the other containing ZSM and  $\beta$  zeolite at a ratio of 5:1. See Examples 9 and 10 shown in the declaration. Of note, both ratios fall within the ranges recited in claim 1. The declaration also describes a comparative catalyst, which is the same as that prepared in Comparative Example 1 in the present Specification. See Comparative Example 4. The comparative catalyst, like that prepared in the example of LaBarge, contained ZSM-5, but not  $\beta$  zeolite. The catalysts of this invention and the comparative catalyst were tested for their NO<sub>x</sub> purification activity. It was found that the two catalysts of this invention were

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more effective in NO<sub>x</sub> purification than the comparative catalyst at low catalyst inlet temperature, i.e., 350°C. See Tables 6 and 7 shown in the declaration. Applicants submit that these unexpected results also successfully rebut the *prima facie* case of obviousness.

For the reasons set forth above, claim 1 is not rendered obvious by LaBarge. Neither are claims 4-7 and 9-22, all of which depend from claim 1.

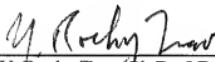
#### CONCLUSION

Applicants submit that the rejection asserted by the Examiner has been overcome and claims 1, 4-7, and 9-22, as pending, cover subject matter that are nonobvious over the cited prior art. It is therefore requested that the Examiner allow this application.

The Petition for Extension of Time fee in the amount of \$120.00 is being paid concurrently herewith on the Electronic Filing System (EFS) by way of Deposit Account authorization. Please apply any other charges or credits to Deposit Account No. 50-4189, referencing Attorney Docket No. 66501-013US1.

Respectfully submitted,

Date: 2-19-08

  
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